A Sliding Device for Railway Switches

Technical Field

The present invention relates to a sliding device for railway switches.

The subject device is meant for use both when installing new track switches and in existing switches.

It can also be mounted on any type of switches (simple, double, intersecting etcetera) and for most lines provided with rail tracks according to technical-constructive standards in accordance with the characteristics of the present invention.

Background Art

Currently, in accordance with the prior art, different types of sliding devices are available, able to be positioned inside the tracks in proximity with a switch in which, as is well known, co-operate a stock rail mounted by means of anchoring shoes to sleepers, and points capable of translating, according to the manoeuvres imposed to the switch, between an active position, in which it is close to the stock rail, and an inactive position, in which it is removed from the stock rail. To the rail are associated sliding bearings which, in the absence of sliding devices, allow the switch points to move between said active and inactive position sliding over an upper portion thereof.

Substantially, known sliding devices comprise a support structure bearing one or more rotating sliding elements able to support the points in a position removed from the stock rail. The support structure is generally mounted on the track with fastening means.

Depending on the support structure, on the rotating sliding elements and on the fastening means adopted, different constructive solutions can be

configured, and hence different types of sliding devices.

A first type of device is derived directly on the sliding bearing of the points or anyway requires a specific design of the sliding bearing, as is readily apparent for instance from the description of the patents DE 4041264 and US 5390881. This known kind of device has the drawback of being able to be mounted exclusively on a bearing especially designed to receive it. It cannot be applied to the most common standards of sliding bearings currently present for instance on railway lines. This entails that said device can only be mounted when building a switch, whereas it cannot be mounted on existing switches unless the previously mounted sliding bearing is completely replaced or costly modifications are made to adapt the sliding bearing, which is not always feasible.

According to another known type of sliding device, a support structure is used, mounted on the tracks with fastening means connected in overhang to the sleepers or connected between two consecutive sleepers. In this regard, see for example the descriptions of the patents US 5509626, DE 1658366 and AT 375697. This type of device is suitable, unlike the previous one, to be mounted on any type of switch, even if already installed, because the fastening means of the support structure of the rotary sliding elements refer mainly to the sleepers, and hence to elements that generally have standardised technical-constructive characteristics. The main defect of this kind of device is that it is not sufficiently simple to install and at times it requires the introduction of small modifications to enable to connect the fastening means which must be able to unload the stresses of the rotary sliding elements which are not positioned directly over the sleepers.

In an additional known kind of device, anchoring to the track occurs directly on the rail flange with fastening means that require the introduction of a plurality of elements (for instance, anchoring pincers shaped complementarily with respect to the flange of the point) which

entail increased production and installation expenses (see description of the patent CH 368201).

A last type of sliding device, which in itself overcomes the aforesaid drawbacks, is described in the patent EP 922 807.

It is a sliding device for railway switches which comprises a support structure provided with fastening means which allow it to be mounted superiorly to a sliding bearing of any kind, mounted on the upper part of a sleeper, without requiring any modification to the elements constituting the switch.

This support structure has a box like arrangement, substantially shaped complementarily to an upper portion of the sliding bearing, and it is provided with two lateral flanks, on each whereof is mounted at least a shaft which supports at least a rotary sliding element able to support the point when it is removed from the stock rail.

During the use of the latter type of sliding device, however, it has been noted that the position of the sliding bearing relative to the point is never the same even in the case of identical switches mounted on similar tracks.

Consequently, when mounting the sliding device it is necessary to adjust its position relative to the point, using shims.

Obviously, this entails a lengthening of the time require to install the sliding device, as well as poor mounting precision.

Disclosure of Invention

In this situation, the technical task constituting the basis for the present invention is to obtain a sliding device for railway switches that overcomes the aforesaid drawbacks.

In particular, the technical task of the present invention is to provide a sliding device for railway switches that is easily mounted on any railway switch, irrespective of the relative position of the bearing and of the point.

The specified technical task and the indicated aims are substantially achieved by a sliding device for railway switches as described in the appended claims.

Description of the Drawings

Further features and advantages of the invention shall become more readily apparent from the detailed description of some preferred, but not exclusive, embodiments of a sliding device for railway switches, illustrated in the accompanying drawings, in which:

- Figure 1 shows an exploded axonometric view of a first embodiment of a sliding device according to the present invention;
- Figure 2 shows an exploded axonometric view of a second embodiment of a sliding device according to the present invention;
- Figure 3 shows an exploded axonometric view of a third embodiment of a sliding device according to the present invention;
- Figures 4 through 12 and 21 through 24 shows exploded axonometric views of the variants of the sliding devices of Figures 1, 2, and 3;
- Figure 13 shows an exploded axonometric view of a fourth embodiment of a sliding device according to the present invention;
- Figures 14 through 20 shows an exploded axonometric of the variants realizzative of the device of Figure 13;
- Figures 25 through 27 show a schematic and sectioned view of three operative configurations of a sliding device according to the present invention; and
- Figures 28 and 29 show a detail of a sliding device according to the present invention.

Description of the Illustrative Embodiment

With reference to the aforesaid figures, the reference number 1 globally designates a sliding device 1 for railway switches according to the present

invention.

The sliding device 1 is meant to be coupled to railway switches (not shown) which have at least a fixed stock rail and a least a point movable, on command, between an active position, in which it is close to the stock rail, and an inactive position, in which it is distanced from the stock rail.

The sliding device 1 shown in the accompanying figures is destined to support the point during its move between the active position and the inactive position and during its permanence in the inactive position, according to the operating procedures described in the patent EP 922 807.

The sliding device 1 comprises first of all a support structure 2 which has a central body 3 and two lateral flanks 4 connected to the central body 3. The central body 3 can be coupled to an upper portion of a sliding bearing mounted over a sleeper of a track (not shown), and the support structure 2 has a "C" shaped, in order partially to encompass the sliding bearing.

In the illustrated embodiments, the central body 3 is constituted by a flat plate which may have laterally (with reference to the direction of development which in use is perpendicular to the track) two flanges 5, perpendicular thereto, extending downwards, for the connection of the lateral flanks 4.

The sliding device 1 is also provided with at least two rotary sliding elements 6 able to support the point in the inactive position. In general, they are idle rollers 6 pivotally engaged to the lateral flanks 4 of the support structure 2, with horizontal axes of rotation, mutually parallel and substantially perpendicular, in use, to the direction of actuation of the point in correspondence with the sliding device 1.

Depending on the position in which the sliding device 1 is applied relative to the switch, two, four, six or more rotary sliding elements 6 can be provided, with half associated to a lateral flank 4 and half to the other

one.

Also provided are means 7 for fastening the support structure 2 to the sliding bearing or to the railway sleeper.

Advantageously, the lateral flanks 4 have at least a first part 8 associated to the central body 3 and at least a second part 9 associated to the first part 8.

The first part 8 is fastened to the central body 3, for instance by means of welding, and, in the illustrated embodiments, it vertically extends laterally to the central body 3 itself (in the cases where they are present, it is coupled to the vertical flanges 5 of the central body 3).

The second part 9 is instead movable relative to the first part 8 in such a way as to be adjustable vertically relative thereto, to adapt the position of the sliding elements 6 to the operative conditions of the switch whereto the sliding device 1 is applied.

In particular, in the illustrated embodiments, the second movable part 9 of the flanks is removably secured to the first fixed part 8, whereto it is connected by means of one or more fastening screws 10 which are inserted into threaded holes 11 obtained on the fixed part 8 and possibly on the vertical flanges of the central body 3. In correspondence with the threaded holes 11, the mobile part 9 has vertically elongated through holes 12 which allow to adjust its position.

Depending on requirements, the second mobile part 9 of the flanks can be adjustable relative to the fixed part 8, both in continuous fashion (solution, not shown herein, in which the coupling surfaces are smooth), and in discrete fashion (as shown in the accompanying figures) with the capability to provide adjustment according to a predefined pitch.

In the illustrated embodiments, the first part 8 and the second part 9 of the lateral flanks 4 respectively have a first and a second coupling surface 13, 14, at least partly substantially having complementary shapes. In particular, each coupling surface 13, 14 has a indentations 15 for

coupling with the other surface (the indentations 15 are visible only in Figures 25 through 27, whilst in the other figures it is shown with a black area).

The pitch of the indentations 15 constitutes the pitch for adjusting the movable part 9.

The discrete adjustment solution illustrated herein is preferable both when there are requirements for mechanical tightness between the movable part 9 and the fixed part 8, and to facilitate the positioning of the rotary sliding elements 6.

As shown for instance in Figure 3, the movable part 9 or the fixed part 8 of each lateral flank 4 or both (the latter being the preferred solution) have an appendage 16 with mainly horizontal development positioned on the side of the device which in use is oriented towards the track.

This appendage 16 is able, in use, to be coupled to the lower part of the stock rail, and it inferiorly has a profile 17 for coupling to said stock rail.

Advantageously then, the appendage 16 is provided with means 17 for adjusting the position of the movable part 9 or of the fixed part 8 whereof it is a part, operatively active in correspondence with the coupling profile 17.

In the illustrated embodiments, the adjustment means 17 comprise a through screw 18 with mainly vertical development, inserted through the appendage 16 in proximity with its tip.

In use, the lower end of the through screw 18 thrusts against the lower part of the stock rail.

Given the stresses and the vibrations whereto the sliding device 1 is subjected in use, preferably means 19 for locking the through screw 18 are provided, for selectively enabling or inhibiting its adjustment. In the accompanying figures, the locking means 19 are constituted by a horizontal screw 20 which intercepts each through screw 18.

Preferably, as shown in Figures 25, 26 and 27, each idle roller 6 has a

lateral surface 21, hump shaped, to improve the sliding of the point.

In regard to the fastening means 7, they can assume the most suitable shape according to requirements.

In particular, the accompanying figures show two types of fastening means 7, sharing the same general concept.

In both cases, the fastening means comprise at least a slot 22 obtained in the support structure 2 and at least a locking member 23 inserted through the slot 22.

This solution allows to adjust the position of the sliding device 1 relative to the bearing and to the point.

The slot 22 is elongated according to a substantially horizontal direction of development and, in use, transverse to the track, whilst the locking member 23 is able to be hitched in use either with the sliding bearing or with the sleeper.

In the embodiment of Figure 2, the locking member 23 is not shown, but it can be constituted either by a locking screw, or by the mounting screw of the sliding bearing.

Although it is not shown in the Figures, in the case of Figure 2 the slot 22 is obtained along the central longitudinal axis of the central body 3, in correspondence with the end 24 which in use is farther away from the track. Moreover, the slot 22 is open in correspondence with said end 24 and two holed metal plates 25 are provided for tightness (Figure 12).

In the case of the embodiments of Figures 1 and 3, there are two slots 22 obtained in the lateral flanks 4, each associated to a locking member 23 which comprises a tightening screw 26 inserted through the slot 22 and operatively associated to a first and a second engagement element 27, 28 (Figure 6 and 7). In the case of Figure 1 and 7, there are two second engagement elements 27, 28, interchangeable, of different size, to adapt the device to any kind of bearing.

The first engagement element 27 has a nut screw 29 for receiving the

tightening screw 26.

The first and the second engagement elements 27, 28, which can be inserted into cavities present on the sliding bearing, have respective inclined surfaces 30, relative to said tightening screw 26, which allow their mutual sliding.

Whilst the second engagement element 28 can be kept distanced from the lateral flank 4 by a spacer 31, the first engagement element 27 can slide along the tightening screw 26 following its rotation in a direction or in the other.

Consequently, screwing the tightening screw 26 causes the movement of the two engagement elements 27, 28 within the cavity (by mutual sliding along the respective inclined surfaces 30), between a first configuration of minimum bulk, in which they can be inserted without interference into the cavity, and a second configuration of maximum bulk, in which they act in sealed fashion within said cavity by means of two corresponding gripping surfaces 31.

Between the two engagement elements 27, 28 is also inserted a return spring 32 which tends to keep them in the position of minimum bulk.

For additional details about this second type of fastening means 7, reference is made to the description provided in the patent EP 922 807.

Advantageously, between the head of the tightening screw 26 and the lateral flank 4, is interposed an indented washer 33 which interacts with an additional indented portion 34 of the lateral flank 4 (shown in black colour in the accompanying figures).

The exploded view of Figures 1 through 24 also show constructive elements (such as washers, split pins, bearings, etc.), not described because they are known, and utilised in the usual fashion for mounting, in particular, the idle rollers 6).

The mounting of the sliding device 1 of the present invention provided with the engagement elements 27, 28, entails, first of all, the preparation

of the bearing whereto it is to be applied, which is cleaned and deburred at least on the edges. In particular, the cavities of the bearing must be completely freed from any deposits which may have accumulated therein.

Subsequently, the two engagement elements 27, 28 are inserted into the cavities and the support structure 2 is installed above the bearing.

At this point, the tightening screws 26 are inserted through the slots 22 and screwed to the nut screws 29 to lock the device.

In this step, the device is also correctly positioned transversely to the track by means of the slots 22.

Once the fastening operation is complete, the height of the idle rollers 6 must be verified to see whether it is adequate.

If it is not, then the tightening screws 26 and the fastening screws 10 are loosened, the movable part 9 is positioned in the correct position relative to the fixed part 8, and the whole is again locked with the tightening screws 26 and with the fastening screws 10.

If the device is so fitted, once the support structure 2 is positioned and locked, it is also possible to act on the through screws 18 of the adjustment means 17 to bring them to bear on the stock rail. Lastly, they are also locked by means of the horizontal screws 20.

The mounting is similar, with obvious modifications, in the case of the first type of fastening means 7 described herein.

The present invention achieves important advantages.

Lastly, the sliding device for railway switches of the present invention can be easily mounted with an optimal adjustment on any railway switch, regardless of the relative position of the bearing and of the point.

It should be noted that the present invention is relatively easy to construct and that the cost connect with the implementation of the invention is not very high.

The invention thus conceived can be subject to numerous changes and variations, without thereby departing from the scope of the inventive

concept that characterises it.

All details can be replaced by other, technically equivalent elements, and in practice all materials employed, as well as the shapes and dimensions of the various components, may be any depending on requirements.

5

* * *